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Enterprise Resource Planning

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Abstract

The Enterprise Resource Planning systems have a role in the sustainable development of the organization, the principle of Enterprise Resource Planning systems is useful to improve the performance of the organization. This search will focus on explain the concept of enterprise resource planning, and on the Evolution of ERP. This search will also focus on explain the characteristics of enterprise resource planning software, then definition of Centralized operations. It will explain SAP and how it helps companies and organizations of all sizes and industries run their businesses profitably, adapt continuously, and grow sustainably and the advantages and disadvantages of SAP. At the end there some Famous companies that using SAP.

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Enterprise Resource Planning

ERP systems are the kind of software tools which are used to manage the data of an enterprise. ERP system helps different organizations to deal with different departments of an enterprise. Different departments like receiving, inventory management, customer order management, production planning, shipping, accounting, human resource management, and other business functions.

Basically, it is the practice of consolidating an enterprise's planning, its manufacturing, its sales and marketing efforts into one management system. It combines all databases across different departments into a single database which can be easily accessible to all employees of that enterprise. It helps in automation of the tasks involved in performing a business process.

Despite the growing interest in ERP systems, publications on these systems within the academic Information Systems (IS) community, as reflected by contributions to journals and international conferences is only now emerging. Research on ERP systems has been treated as a "secondary" and its importance has been neglected by the IS community. But lately, researchers argue the need for more ERP research.

Definition of Enterprise Resource Planning (ERP)

Enterprise resource planning (ERP) refers to a type of software that organizations use to manage day-to-day business activities such as accounting, procurement, project management, risk management and compliance, and supply chain operations. A complete ERP suite also includes enterprise performance management, software that helps plan, budget, predict, and report on an organization's financial results.

ERP systems tie together a multitude of business processes and enable the flow of data between them. By collecting an organization's shared transactional data from multiple sources, ERP systems eliminate data duplication and provide data integrity with a single source of truth.

Today, ERP systems are critical for managing thousands of businesses of all sizes and in all industries. To these companies, ERP is as indispensable as the electricity that keeps the lights on.

Evolution of Enterprise Resource Planning

Enterprise resource planning (ERP) has evolved as a strategic tool, an outcome of over four decades. This is because of continuous improvements done to the then available techniques to manage business more efficiently and also with developments and inventions in information technology field.

1. Pre-Material Requirement Planning (MRP) stage

Prior to 1960s businesses generally relied on traditional ways of managing inventories to ensure smooth functioning of the organizations. These theories are popularly known as 'Classical Inventory Management or Scientific Inventory Control Methods'. Most popularly used among them were Economic Order Quantity (EOQ); Bill of Material (BOM) etc. However, these systems had very limited scope.

ERP system has evolved from the Material Planning System of 1980's. There are various phases through which this evolution process has gone through. The various phases of development of resource planning system in relation to time and evolution of concept of ERP.

2. Material Requirement Planning (MRP)

MRP was the fundamental concept of production management and control in the mid-1970s and considered as the first stage in evolution of ERP. Assembly operations involving thousands of parts such as automobile manufacture led to large inventories. The need to bring down the large inventory levels associated with these industries led to the early MRP systems that planned the order releases. Such planned order releases ensured proper time phrasing and accurate planning of the sub-assembly items, considering complex sub-assembly to assembly relationships characterized by the Bill of Materials.

A typical example is a bicycle manufacture. To manufacture 100 units of bicycles, one needs 200 wheels, 100 foot-pedals, and several thousands of spokes. On a given day, a plant may have 40 units of complete bicycles in stock, 57 units of wheels, 43 units of foot-pedals and 879 units of spokes. If the plant is to assemble 20 units of bicycles for the next 4 days of production, wheels and spokes-is a non-trivial problem. If the independent demand of the spare parts is also to be taken into account, one can visualize the complexity of it.

A typical automobile plant with hundreds, if not thousands of parts, has to face problems that are in order of magnitude even more difficult. MRP systems address this need. Using the processing power of computers, databases to store lead-times and order quantities and algorithms to implement Bill-of-Material (BOM) explosion, MRP systems brought considerable order into the chaotic process of material planning in a discrete manufacturing operation.

Essentially MRP addresses a single task in manufacturing alone. Material requirement planning (MRP) system was adopted by firms for creation and maintenance of master data and bill of material across all products and part within an organization. MRP on the other hand was an outgrowth of bill of material (BOM) processing, which is purchase order management that utilizes parts list management and parts development.

3. Manufacturing Resources Planning II (MRP- II)

A natural evolution from the first generation MRP systems was the manufacturing planning systems MRP II that addressed the entire manufacturing function and not just a single task within the manufacturing function. MRP II went beyond computations of the materials requirement to include loading and scheduling. MRP II systems could determine whether a given schedule of production was feasible, not merely from material availability but also from other resource point of view.

Typically, the resources considered from MRP II systems would include production facilities, machine capacities and precedence sequences. The increased functionality enabled MRP II systems

provided a way to run the system in a loop. First it was used to check the feasibility of a production schedule considering the constraints; second to adjust the loading of the resources, if possible, to meet the production schedules; third to plan the materials using the traditional MRP II systems. Both MRP system and MRP II systems were fairly successful in industry. Due to the power of information systems-databases, algorithms and their integration, organizations did find real support for efficiently managing the manufacturing function in the eighties.

4. ***Enterprise Resource Planning (ERP)***

The nineties saw unprecedented global competition, customer focus and shortened product life cycles. To respond to these demands' corporations had to move towards agile (quick moving) manufacturing of products, continuous improvements of process and business process reengineering. This called for integration of manufacturing with other functional areas including accounting, marketing, finance and human resource development.

Activity-based costing would not be possible without the integration of manufacturing and accounting. Mass customization of manufacturing needed integration of marketing and manufacturing. Flexible manufacturing with people empowerment necessitated integration of manufacturing with the HRD function. In a sense the 1990s truly called integration of all the functions of management. ERP systems are such integrated information systems build to meet the information and decision needs of an enterprise spanning all the functions of management4.

5. Extended ERP (E-ERP)

Further developments in the enterprise resource planning system concept have led to evolution of extended ERP (E- ERP) or web - enabled ERP. With globalization on one hand and massive development in the internet technology on the other, need for web-based IT solution was felt. Thus E-ERP is development in the field of ERP which involves the technology of Internet and World Wide Web (WWW) to facilitate the functions of an organization around the web.

6. Enterprise Resource Planning II (ERP- II)

ERP II is the advanced step of E-ERP. It is the software package which has strengthened the original ERP package by included capabilities like customer relationship management, knowledge management, workflow management and human resource management. It is a web friendly application and thus addresses the issue of multiple office locations.

7. ERP – A Manufacturing Perspective

ERP systems evolved out of MRP and MRP II systems. MRP systems addressed the single task of materials requirements planning. MRP II extended the scope to the entire manufacturing function. The manufacturing industry traditionally had a better climate to use computers. First of all, the manufacturing community being dominated by engineers had no computer phobia. Second the extensive use of Computer Aided Drafting (CAD), Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) had prepared the manufacturing function to use computers well, in fact exceptionally well. In fact, manufacturing engineers contributed significantly to the theoretical computer science by way of contributions in the areas of graphics, computational geometry, significant visualization, feature recognition etc.

Large corporations like General Motors (GM), Ford, Hewlett Packard (HP), and Digital primarily viewed themselves as manufacturing companies until the 1980s. Naturally complex MRP systems were considered the ultimate in enterprise information systems. The investments in hardware and software to manage such complex manufacturing solutions gave these systems a visibility unparalleled in the industry. Compared to these systems accounting systems, financial systems or personnel information systems were relatively inconsequential to the organization.

With the globalization of operations and the proliferation of computer networks, it was important that the manufacturing organizations extend their information system across the supply chain.

The supplier's information system spread across continents with complex combinations of hardware and software need to be integrated. Similarly, the dealer-distributor network had to be integrated with the manufacturing information systems. The reduction in product life cycle necessitated a quick response manufacturing system that had its ears tuned to the market.

This forced manufacturing information systems to have a tighter integration with marketing information systems. The manufacturing flexibility had translated into mass customization calling for further integration of information systems. The opening up of several world economies including that of the Asian giants like China and India, the emergence of trade blocks and consolidated markets such as European Union paved the need for accounting and finance functions to be tightly integrated with manufacturing functions. It was not sufficient anymore just to manufacture and sell but organizations had to arrange for finance, comply with complex trade restrictions, barriers, and quotas.

The balance sheets needed to account for multiple currencies, multiple export import rules and regulations, multiple accounting codes, practices, accounting periods. This necessitated further integration of accounting and financial information systems with manufacturing systems. In fact, with large capacities built around the world particularly in Asian countries, outsourcing and contract manufacturing became viable alternative even in the high-tech industries like semiconductor manufacturing.

Suddenly the need was for an Enterprise Information System that looks beyond the manufacturing function to address inbound logistics, outbound logistics, manufacturing, materials managements, project management, quality management, accounting, finance, sales and personnel management. It was nearly impossible to integrate individual modules of information systems. What was necessary was a system that addressed the enterprise needs from the design stage. ERP systems were the natural choice in this changed scenario.

Characteristics of Enterprise Resource Planning (ERP)

Many ERP vendors are in the market, but not all systems are created equal. To find the right system for your organization, you need to understand the key features and capabilities that distinguish a good ERP system from a great one. Here are some crucial characteristics to look for in an ERP system:

1. ***Flexible***

   These days, way of doing business is changing fast due to changing in law and amendments in the standards. So, management of business process which is done through ERP should be flexible. If ERP system will be flexible, we can change processing system as per our requirement.

2. ***Modular and Open***

   One of the great characteristics of any good ERP system that it has open module architecture. It means, if there is error in any module, we can correct it by opening it instead affecting all other modules. For example, Open ERP has following module which can be open separately.

3. ***Comprehensive***

   ERP system should be advance and it should use comprehensive way. It means, all most all the functions of business should be done through ERP System. If we will get only small number of activities through ERP and other will be done through manual, then, this ERP system is not ok. Its capacity should to cover all the functions of business.

4. ***Online-Connection with Other ERP System***

   Today, in the market, there are lots of ERP solution but which is the best, it will tell its features? Check whether it has capacity to connect another ERP system online or not. Because, today business has started to interact with millions of other business. So, it is necessary to connect them online through our ERP.

5. ***Best Business Practices***

   Each business activities have lots of standards. For example, accounting follows IFRS, quality

management follows ISO 9000 and marketing follows the standard of MASB. So, your ERP system will be updated regarding all standards.

6. ***Multi-Facilities***

   A good ERP System should have multi-facilities. It means, it can work in multi-currencies, multi-mode manufacturing and multi-platform.

7. ***Strategic planning***

   Strategic Planning is the main and top function of business. It should be done through ERP. ERP should integrate all its sub-part systems for making better strategic planning.

8. ***Optimize the data***

   A good ERP system optimize the data for effective utilization of limited business resources. It also optimizes the data for reducing cost and risk.

9. ***Project Management***

   A good ERP System collaborate the team in real time for working together on a project. Everything about the project process can be tracked through this.

10. ***Automatic Functions***

    We can measure the quality of ERP from its advance automatic functions. With these automatic functions, organization saves his lots of time. This automatic function may be in electronic fund transfer, electronic data interchange and eCommerce.

Centralized Operations

Centralization operations refers to the process in which activities involving planning and decision-making within an organization are concentrated to a specific leader or location. In a centralized organization, the decision-making powers are retained in the head office, and all other offices receive commands from the main office. The executives and specialists who make critical decisions are based in the head office.

Systems Applications and Products in Data Processing (SAP)

SAP stands for Systems Applications and Products in Data Processing. SAP, by definition, is also the name of the ERP (Enterprise Resource Planning) software as well as the name of the company. SAP Software is a European multinational, founded in 1972 by Wellenreuther, Hopp, Hector, Plattner, and Tschira. They develop software solutions for managing business operations and customer relationships.

SAP system consists of a number of fully integrated modules, which covers virtually every aspect of business management. SAP is #1 in the ERP market. As of 2010, SAP has more than 140,000 installations worldwide, over 25 industry-specific business solutions and more than 75,000 customers in 120 countries. Other Competitive products of SAP Software in the market are Oracle, Microsoft Dynamics, etc.

SAP enterprise resource planning (ERP)

SAP's various ERP products enable its customers to run their business processes, including accounting, sales, production, HR and finance, in an integrated environment, with data from each module stored in a central database. The close integration and common data store ensure that information flows from one SAP ERP component to another without the need for redundant data entry and help enforce financial, process and legal controls.

The most widely installed SAP system, SAP ERP Central Component (SAP ECC), is an on-premises ERP system that is usually implemented in medium-size and large companies.

At one time, the term "SAP ERP" was synonymous with ECC. Nowadays, it is a catchall for all of SAP's ERP products: ECC, S/4HANA, Business One and Business By Design.

ECC remains SAP's flagship ERP and the basis of the next-generation product, S/4HANA. Its modules are separated into functional modules and technical modules. The functional modules include the following:

- Human Capital Management (SAP HCM)

- Production Planning (SAP PP)
- Materials Management (SAP MM)
- Project System (SAP PS)
- Sales and Distribution (SAP SD)
- Plant Maintenance (SAP PM)
- Finance and controlling (SAP FICO)
- Quality Management (SAP QM)

SAP's advantages

Here are some of the advantages contained in the SAP system:

Delivering Efficiency in Work

SAP allows all data to be well integrated with various databases. For this reason, this system is able to streamline business processes so that companies can collect data more easily and efficiently.

Increase Productivities

The SAP system can increase employee productivity because the program is well integrated.

Complete Features

SAP has various analytical features, such as evaluating performance as well as making decisions. The availability of features allows this software to meet many business needs.

Suitable for All Business Dimensions

The SAP system is very suitable for use in almost all existing business dimensions. This system provides flexibility for company growth, including small and medium enterprises.

There is integration with E-Commerce

In today's digital era, e-commerce plays a very important role. The existence of a system that can be integrated with e-commerce will obviously be very helpful for e-commerce businesses.

The existence of a module that makes work easier

There are various modules that make up the SAP system. Each of these modules has different functions in the same system. These modules share information so that this can facilitate business managerial obligations.

Consistent

The SAP system always prioritizes consistency, both in the same division and in opposite divisions.

Data Cannot Be Replicated

Data stored in the SAP system cannot be duplicated. This of course can ensure the confidentiality of important data owned by the company.

Implementing Standardization

Every business process recorded in this system will be standardized. Thus, the company will have good standardization.

Disadvantages of SAP ERP

Although it has several shortcomings, this system also has several disadvantages, including:

Relatively Expensive

The use of SAP requires relatively large funds. In addition, the maintenance and upgrade costs are quite large.

Demanding High Quality Human Resources

This system requires qualified human resources to enter data precisely and with timeliness. This makes the company have to spend more to pay for the salaries of qualified human resources.

Quite Complicated to Use

SAP systems tend to have complexities that make them quite complicated when used by beginners.

Companies That Use SAP

SAP system consists of a fully integrated module, which covers almost every aspect of business management. It is known for providing an end-to-end solution for various industries, including manufacturing, financials, distribution, and logistics.

SAP has significantly grown its market presence and become a global leader. It bridges the gap between the supply and demand of updated and user-friendly systems. As a result, it is becoming prevalent everywhere. In 2022, the revenue share has grown up to 24%. At this rate, it is expected to become a $2.3 billion company by 2032.

This is an ample opportunity for pitching your ideas to your existing customer base. Thomson Data will help you with a reliable and well-targeted contact list for that. Our extensive database and highly committed team ensure your business reaches its desired goals. You can easily expand your marketing outreach to individuals and companies that use SAP daily.

Table 1 : Details of Few Companies That Use SAP

Company Name	Website	Country	Employee Size	Revenue
Ferrara Candy Company	www.ferrarausa.com	United States	6000	2 B
Benjamin Moore & Co	www.benjaminmoore.com	United States	2506	800 M
FGF Brands	www.fgfbrands.com	Canada	3000	1 B
Impala Platinum	www.implats.co.za	South Africa	50744	8 B
Century Aluminum	www.centuryaluminum.com	United States	2512	1 B

A Case Study

“Delight in every bite” is more than a mantra at Ferrara, the global candy-maker behind SweeTARTS, Trolli, Black Forest, and myriad other world-famous brands. It is a challenge met every day by a joint business and IT team, which makes decisions based on up-to-the-minute views at every level of the sweets giant — from executive-level demand forecasting to a shop floor machine’s throughput.

"Data really needs to be accurate, and it needs to be available in real time," Ferrara Vice President and CIO George Lesko told SAP at the candy maker's headquarters in downtown Chicago. "SAP HANA and analytics actually does all of that for us."

Ferrara uses the in-memory database from SAP to significantly reduce its reporting times, from weeks down to minutes and often from minutes to seconds. The 112-year-old confectionary juggernaut drives innovation with speed, agility, and accuracy thanks to SAP HANA — part of SAP's Business Technology Platform — as well as a comprehensive suite of applications, including SAP ERP.

This technology enables an unprecedented partnership between Ferrara IT and business, Lesko said in an SAP video. And it helps the company envision what's possible with other technologies on the horizon.

The Right Stuff Right Away Getting the right information to business users at the right time was the challenge solved by Ferrara Senior IT Director Mustafa Mustafa and his team. They sought new solutions after traditional technologies failed to provide the necessary agility and time-to-value.

"Ferrara selected SAP because of the unprecedented capabilities of SAP HANA being in-memory, and the versatile capabilities of analytics from SAP to enable us to have a variety of tools to really meet each individual's unique needs," Mustafa said. "It really took the information and put it at the fingertips of the business within seconds versus minutes."

SAP HANA has reduced Ferrara's data storage footprint by 94 percent, compared to legacy database technology, according to Mustafa. And the first SAP dashboard that Ferrara deployed saved the company $200,000 within the first 15 weeks. Plus, accurate real-time data enables Ferrara's salespeople to actively engage with their customers and better meet their needs.

"Ferrara's differentiator by using SAP HANA and analytics is enabling us to make real-time decisions [and] effectively execute upon our goals," Mustafa said. Looking forward, the company wants

“embark on Big Data — applying machine learning and artificial intelligence, so there’ll be other applications within the portfolio that we’re going to add to marry all those together.”

Ferrara Fast, Inside and Out:

“‘Ferrara Fast’ is at the core of our culture. We take pride in our agility and our ability to work together to solve problems,” Ferrara Vice President of Sales Operations & Integration Patrick Degnan said. “SAP technology adds tremendous value to our business. It allows us to combine data sets from different sources and view it in one common hierarchy and reporting structure.”

This allows Ferrara to dive into the data, analyze and understand business trends, and solve problems — faster than ever, according to Degnan. This helps drive growth, both for Ferrara and the retailers that stock its candy.

“When they come to us with quick fixes or quick opportunities, we’re able to collaborate and work together as a team to bring them solutions,” Degnan said. “It truly is a competitive advantage for us and it’s something that our retailers truly value as business partners.”

Delight in Every Byte:

“The SAP HANA system gives us a data warehouse that allows us to pull data, not only from Ferrara’s SAP ERP system, but acquired companies as well,” Gene King, senior manager of SAP BI and App Development at Ferrara Candy Co., said. “Our Ferrara business user cannot tell where the data is coming from — whether it be Ferrara’s own system or the acquired business’ system. It’s seamless to them.”

And there is no overnight batch process, King stated. Transformation happens at query time.

“If there’s a logic issue, we adjust it,” King said. “Boom! Immediately the user is getting the corrected results, no wait time, no outage.”

Ferrara's IT can respond right away to business issues and executives, according to King. Analytics that would have taken days now happen almost instantaneously. This, in turn, helps Ferrara's business users better respond to their customers' needs.

Conclusion

This search has tried to give a clear explain about ERP, its evolution. In addition, it has shown the characteristics of ERP Software. It has also shed light on SAP, its definition, advantages and disadvantages. The following chapter will constitute the practical part of the research. The research is reviewed some companies which using SAP and it becomes one of the most famous companies.

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